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Fish and Wildlife Service
Mid-Columbia River Fishery Resource Office
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MEMORANDUM

August 4, 2014

To: Interested parties

From: Matt Hall

RE: Snorkel survey results for adult spring Chinook salmon and bull trout in Icicle Creek, 2014

The Mid-Columbia River Fisheries Resource Office has conducted an annual summer snorkel survey in Icicle Creek since 2003, with a primary objective of enumerating adult spring Chinook salmon and bull trout. Methods have evolved along with Icicle Creek water management, and the current survey paradigm has been in place since 2006 (Table 1). The surveyed area begins at the Boulders Falls on Icicle Creek (~rm 5.6) and continues downstream to the Icicle/Wenatchee River confluence.

In 2014, the survey was conducted on July 31. For all reaches the weather was sunny and water visibility was estimated at 3.8m and was “fair” for all sections of the river with the exception of turbulence/bubbles that obscured viewing in some small areas (ie. hatchery ladder, headgate, boulder pockets). The flow at the DOE gage at the Icicle Bridge was 300cfs, which is average for this time of year. All bull trout lengths indicated were visually estimated to the nearest odd centimeter. For consistency all lengths are expressed in millimeters.

Table 1. Annual Icicle Creek snorkel dates.

2006	8/3
2007	7/31
2008	8/6
2009	8/5
2010	8/12
2011	8/10
2012	8/9
2013	8/16
2014	7/31

All surveys were conducted in a downstream manner with snorkelers evenly spaced across the stream. The survey was broken into six reaches. The number of adult Chinook salmon and bull trout observed (both live and carcass) and the number of snorkelers utilized per reach are indicated in Table 2. The surveyors enumerated a total of 357 adult spring Chinook salmon and 63 bull trout in Icicle Creek (Figures 1 and 3). Of these, 88 adult spring Chinook and 4 bull trout were observed above Leavenworth NFH intake (Figures 2, 4, 5 and 6).

Table 2. Results of the 2014 Icicle Creek snorkel survey.

<u>Reach</u>	<u>Adult Chinook</u>	<u>Bull Trout</u>	<u>Bull Trout Size Range</u>	<u># Viewers</u>
Boulder Falls – LNFH Intake	88	4	(130-650)	3
LNFH Intake –S2	105	6	(250-490)	3
S2-S5 (Historic Channel)	140	30	(70-350)	4
LNFH Spillway Pool	14	0		3
S5 – Stump Hole	5	23	(210 – 510)	4
Stump Hole – Icicle Mouth	5	0		3
Totals:	357	63	(70 – 650)	
‘06-‘13 Ave:	147	53		
‘06-‘13 Max:	283	157		
‘06-‘13 Min:	48	10		

Of the 63 bull trout observed, 89% were 450mm or less indicating they were juvenile/sub-adult fluvial bull trout (M. Nelson pers. comm.). This is similar to previous years, when >80% of observed bull trout were classified as juvenile/sub-adult fluvial fish.

Although enumeration of Chinook salmon and bull trout was the primary objective, some additional observations were noted. Rainbow trout were abundant in most upstream reaches (S5-Boulder Falls). Three mountain whitefish were encountered above S1. Seven brook trout were counted between the Boulder Falls and S2. Sixteen sockeye and 3 summer Chinook were encountered.

In the Pacific Northwest, the summer of 2014 was hot and dry, however the rivers were mildly buffered from this effect by a slightly above average and lingering snowpack. This resulted in average discharge levels and only slightly above average river temperatures in the month of July leading up to the snorkel survey. One hypothesis regarding bull trout usage of Icicle Creek suggests that bull trout may seek “thermal refuge” in the cooler Icicle Creek in years when the Wenatchee River temperatures are high. There is a positive correlation between Wenatchee River July mean 7DADmax temperatures and bull trout abundance in Icicle Creek on the day of the snorkel survey (Figure 7). In 2014, July Wenatchee river temperatures were slightly warmer than average, and a moderately high number of bull trout in Icicle Creek, with 63 fish encountered.

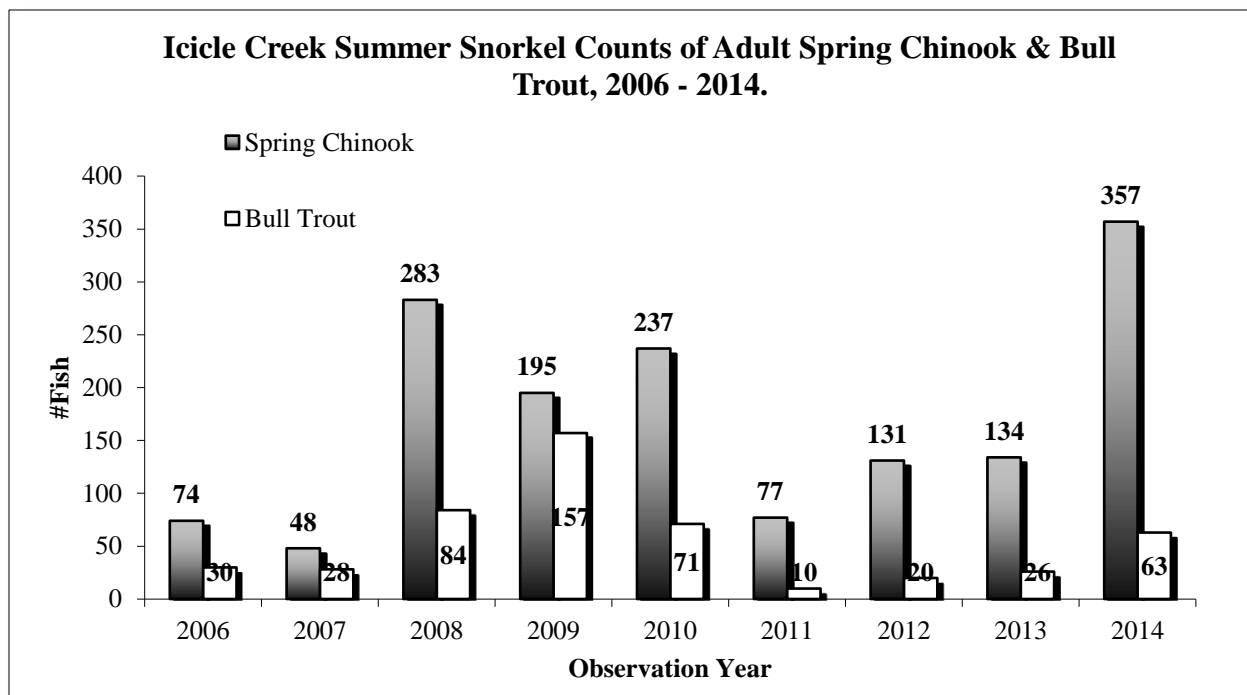


Figure 1. Icicle Creek snorkel survey counts by year.

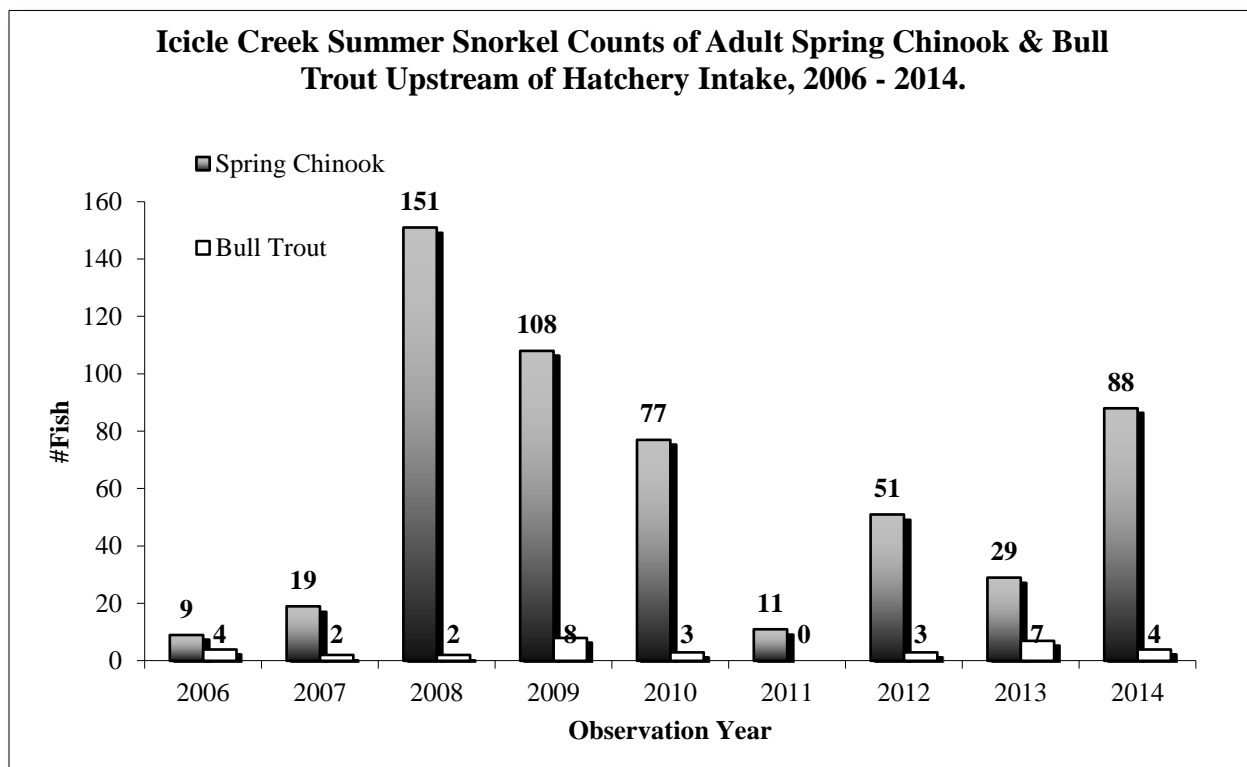


Figure 2. Icicle Creek snorkel survey counts above the Hatchery Intake, by year.

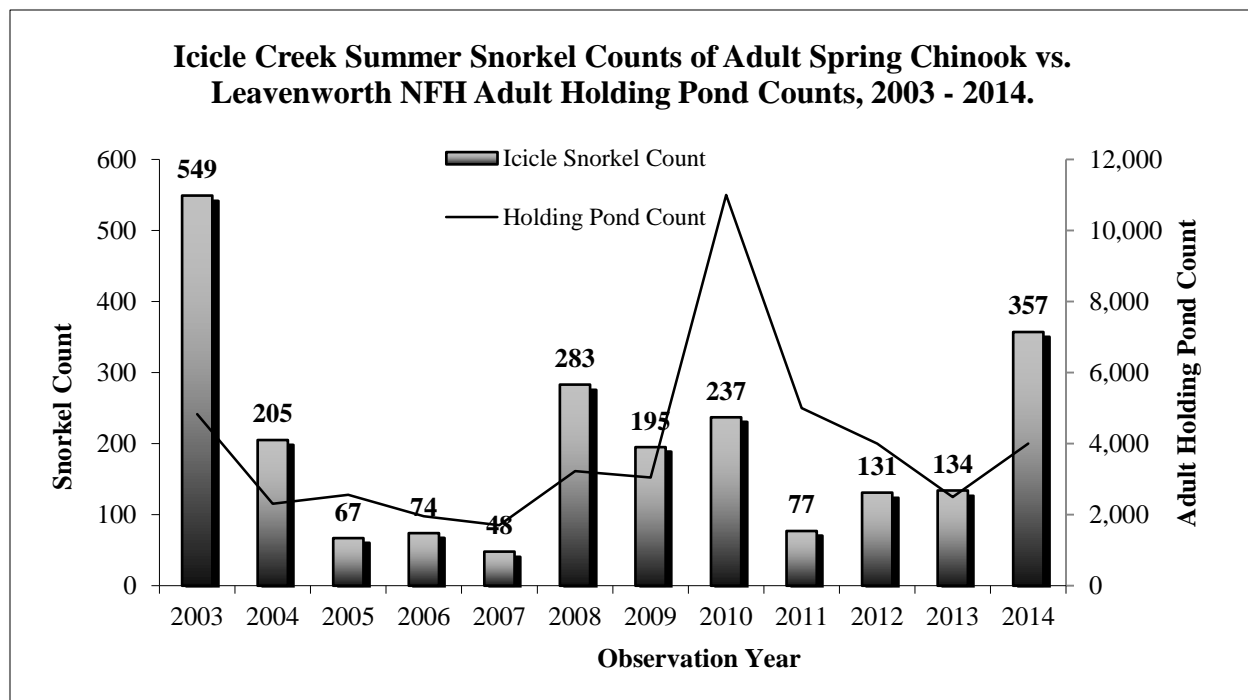


Figure 3. Icicle Creek snorkel counts vs. LNFH adult pond counts, by year.

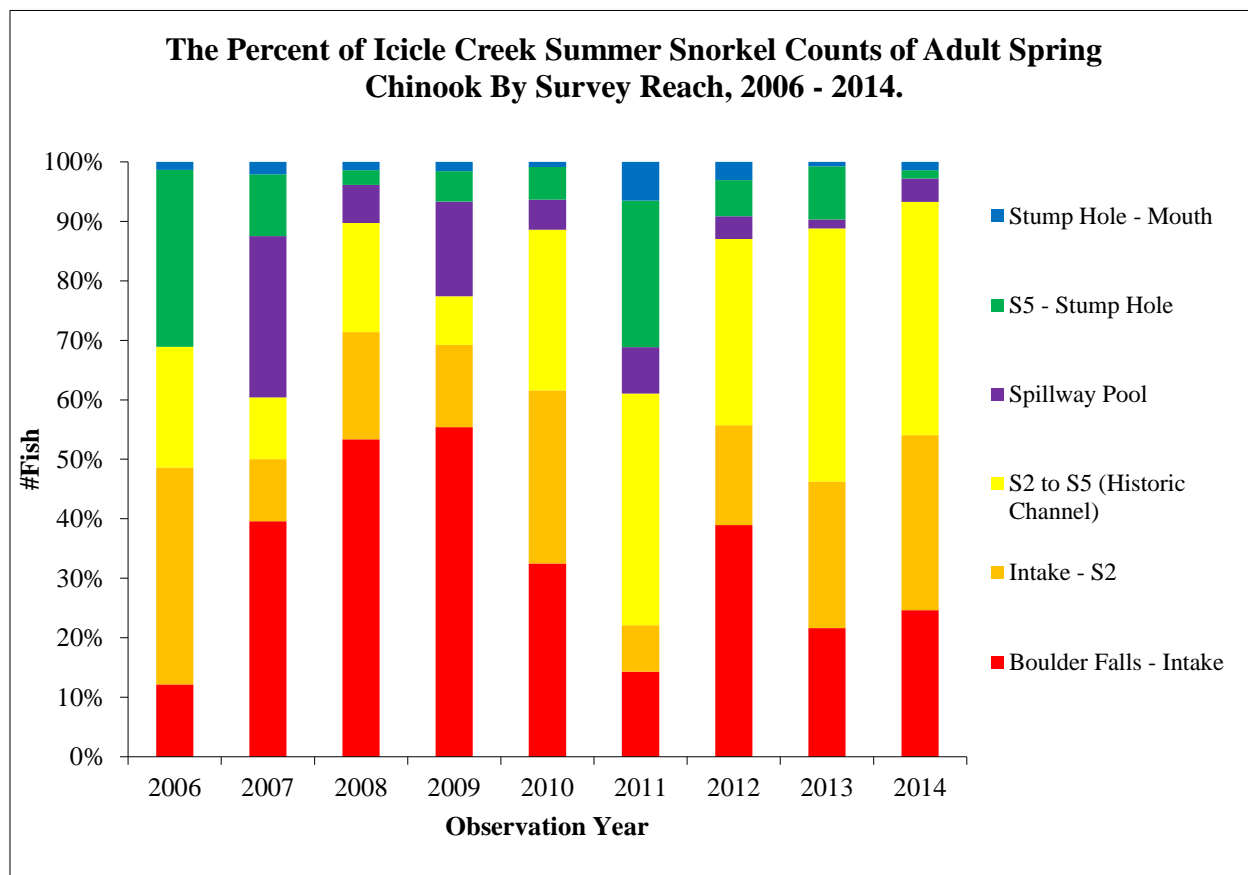


Figure 4. Spring Chinook distribution by reach and year.

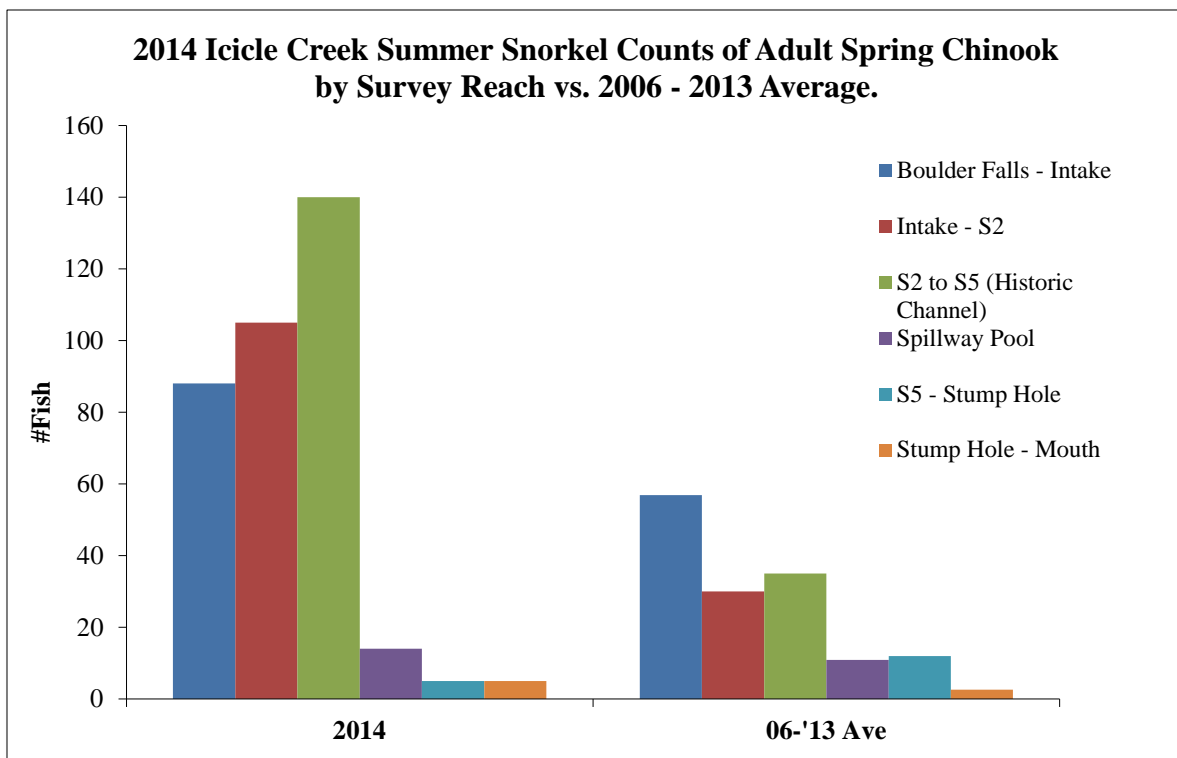


Figure 5. Spring Chinook counts, 2014 vs. average 2006-2013.

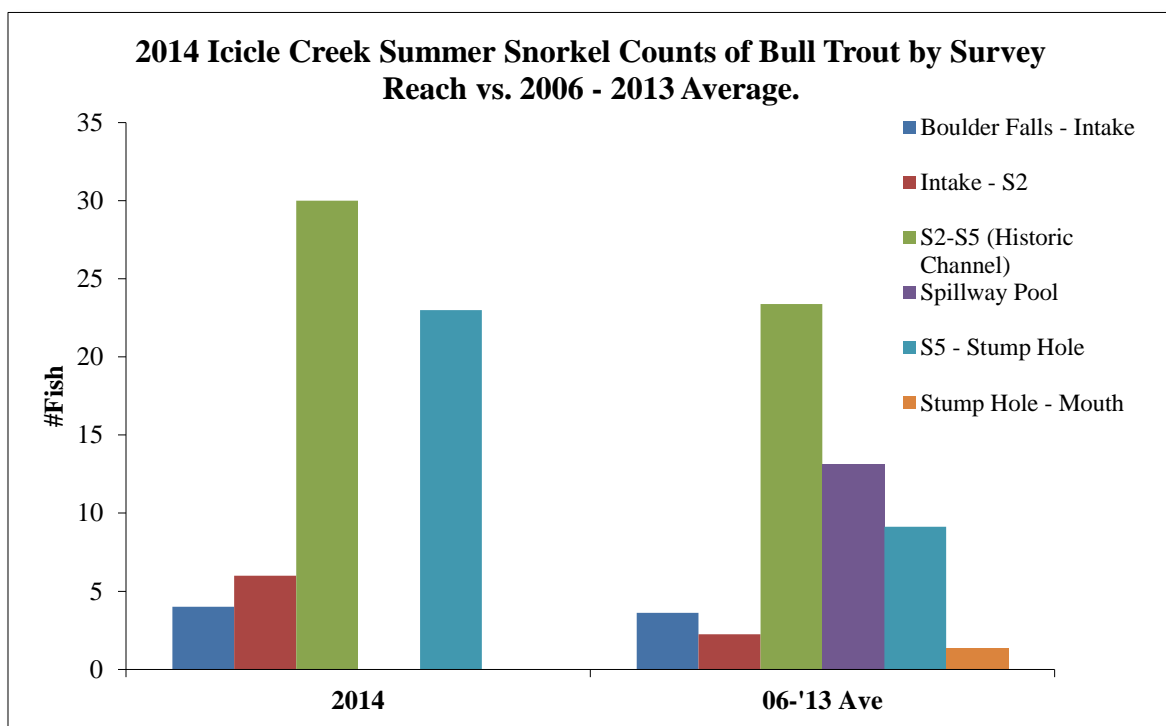


Figure 6. Bull Trout counts, 2014 vs. 2006-2013.

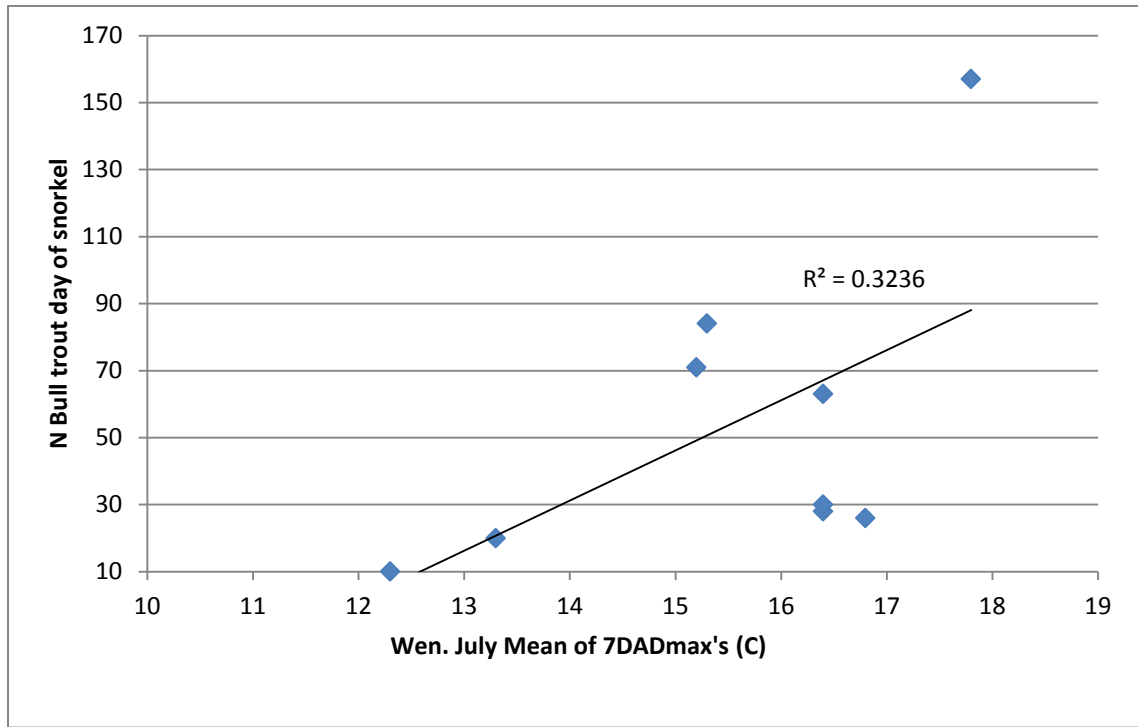


Figure 7. Wenatchee River summer high temperature predicting Bull trout in Icicle Creek.